۲۵-۲۸ اردیبهشت ۱۴۰۳

چهارمین کنگره دوسالانه
کودکان
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Pediatric sleep breathing disorders

Pediatric sleep breathing disorders:

- Central sleep apnea syndromes
- Obstructive sleep-disordered breathing (OSDB)
- Sleep related Hypoventilation
- Sleep related hypoxemia

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Obstructive sleep-disordered breathing (SDB)

- Primary snoring
- Obstructive sleep apnea syndrome (OSAS)
- Upper airway resistance syndrome (UARS)
- Obstructive hypoventilation

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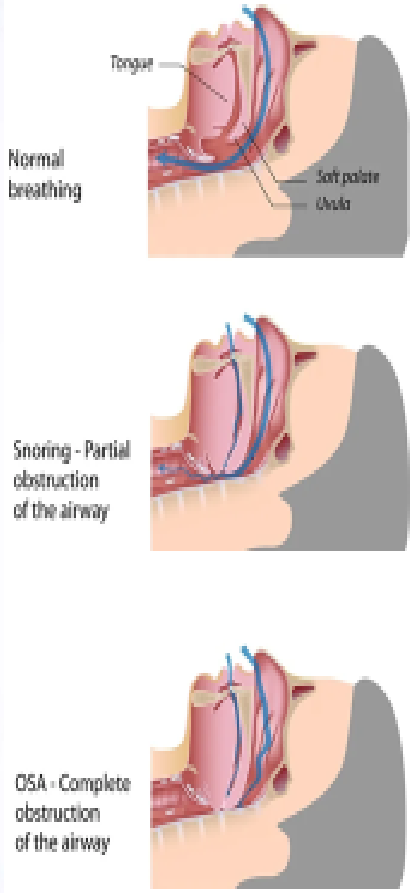
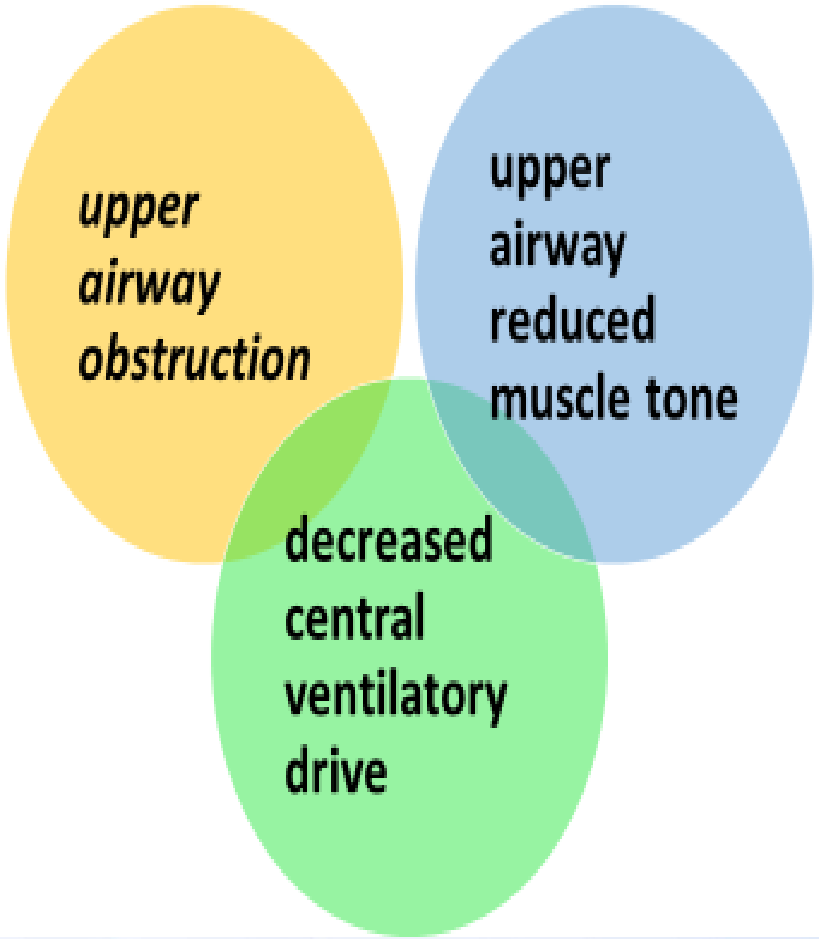
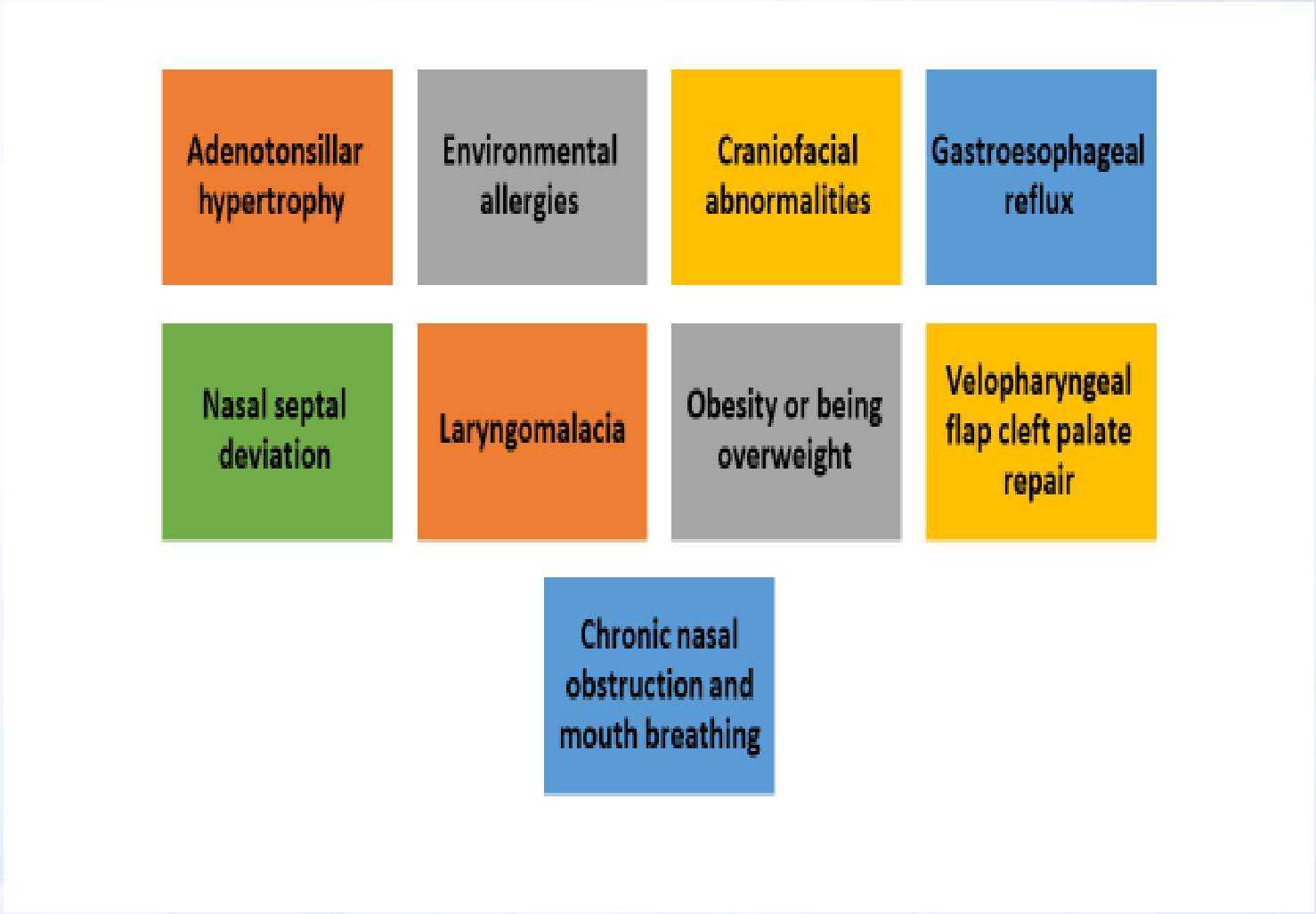
Etiology of OSA





Upper airway obstruction



Upper airway reduced muscle tone

Neuromuscular disease

Hypothyroidism

Reduced central ventilator drive

Arnold-Chiari malformation

Myelomeningocele

Brainstem injury or masses

Major Risk factors

- Adenotonsillar Hypertrophy
- Genetic Syndromes
- Craniofacial Anomalies,
- Neuromuscular Disease ,CP
- Obesity
- Laryngomalacia
- Surgery
- SCD
- Asthma & Allergy
- GER
- Recurrent Sinusitis
- Structural Malformations of Brain Stem
- Metabolic Disorders
- Hypothyroidism

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prevalence

- Obesity (13% to 78%),
- Down syndrome (57% to 100%) ,
- Prader-Willi syndrome (93%) ,
- Neuromuscular disorders (53% children with Duchenne)
- Chiari malformations)
- Myelomeningocele (60% in children with CM84)
- Craniofacial anomalies that obstruct the upper airway (Achondroplasia : 48%, Pierre Robin 76%, , Craniofacial dysostoses 50% to 91%)
- History of prematurity:(prevalence of OSAS of 7.3%),

- ***Behavioral abnormalities,***

COMPLICATIONS:

- ***Neurocognitive impairment,***
- ***Learning disabilities,***
- ***Systemic hypertension and pulmonary hypertension,***
- ***increase the risk of cardiovascular events in adulthood.***
- ***Endocrine & Metabolic disorders,***
- ***Nocturnal enuresis***
- ***Increased healthcare use***
- ***Maxillofacial dysplasia (adenoid faces),***
- ***Delayed growth and development,***

COMPLICATIONS:

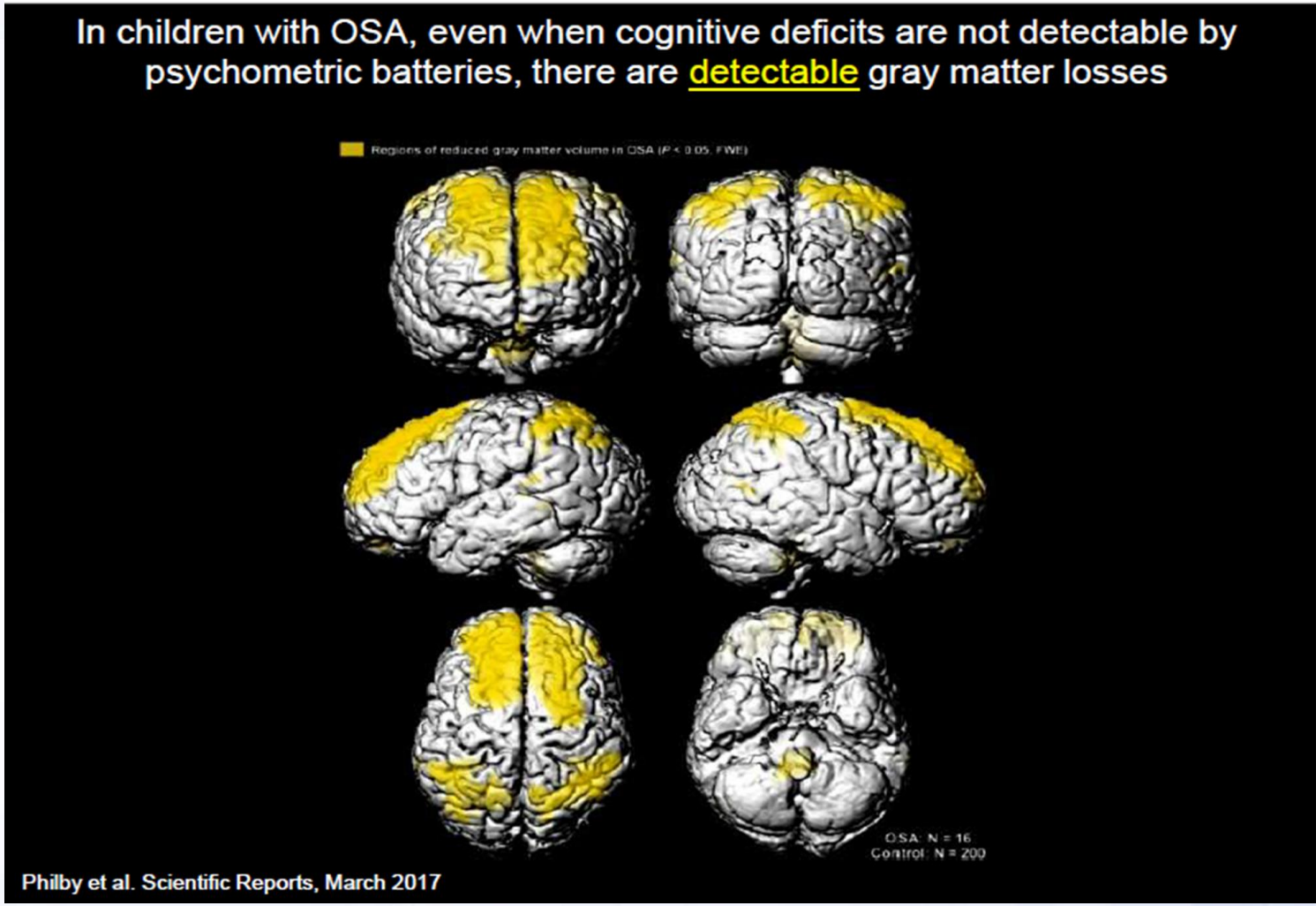
Depression scales are increased in snoring children.

39% obese children with SDB and 27% of normal weight children with SDB report clinically significant levels of Anhedonia (inability to experience pleasure from activities usually found enjoyable) , lack of motivation or desire to participate in an activity

COMPLICATIONS:

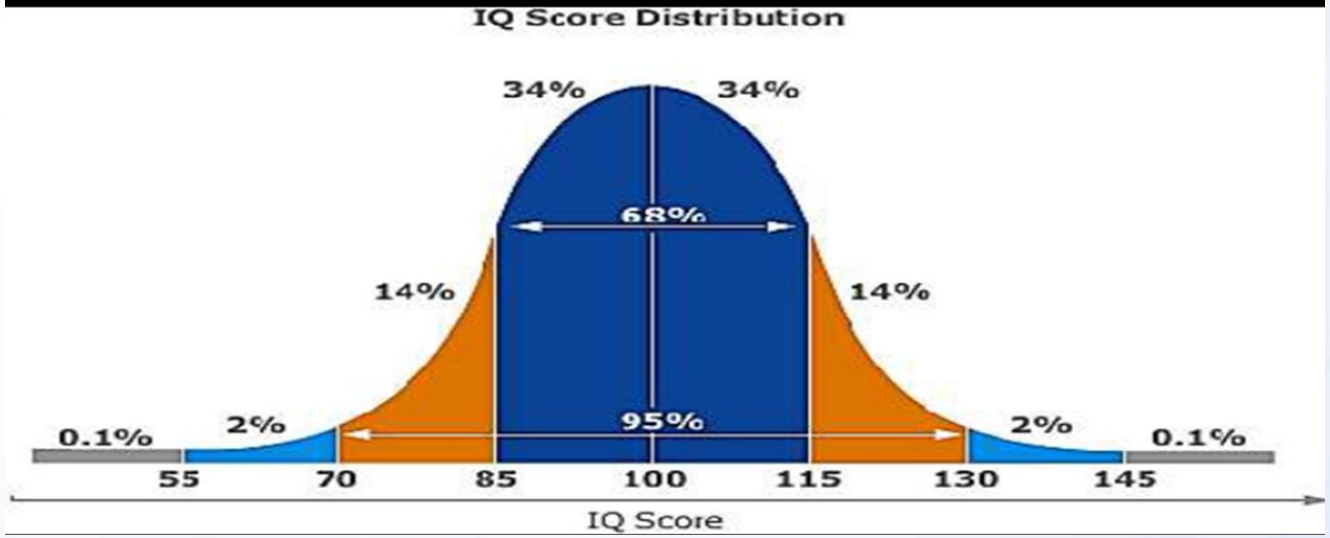
- OSA is associated with elevated daytime and nocturnal BP in normal weight children *(Li et al, 2008)*
- Children with **moderate to severe OSA** have higher ambulatory BP compare with those who are primary snorers *(Kang, Hsu et al, 2015)*

COMPLICATIONS:

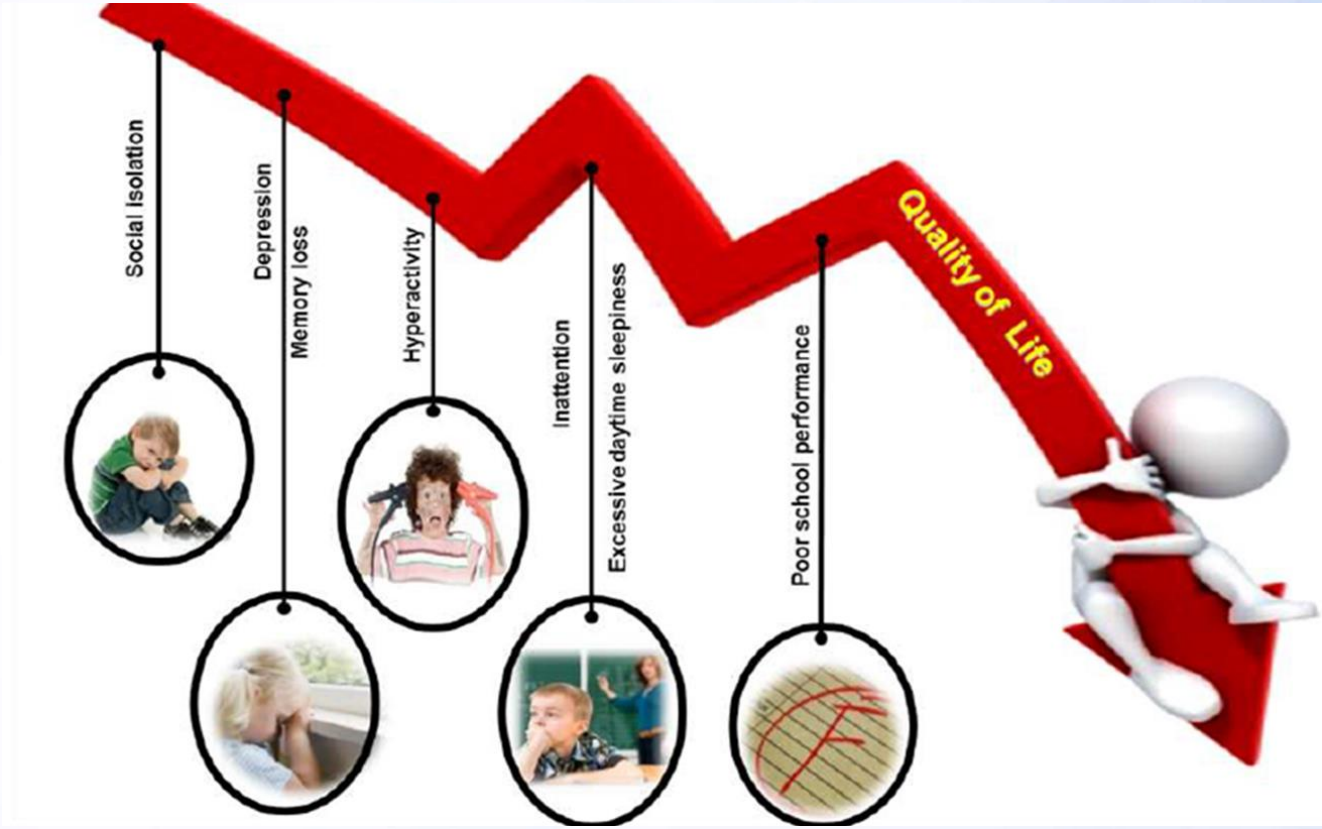


COMPLICATIONS:

IQ Range	Classification	Population
Above 145	Genius	0.1%
130-145	Very superior	2%
115-130	Superior	14%
85-115	Normal	68%
70-85	Dullness	14%
Below 70	deficiency	2%



COMPLICATIONS:

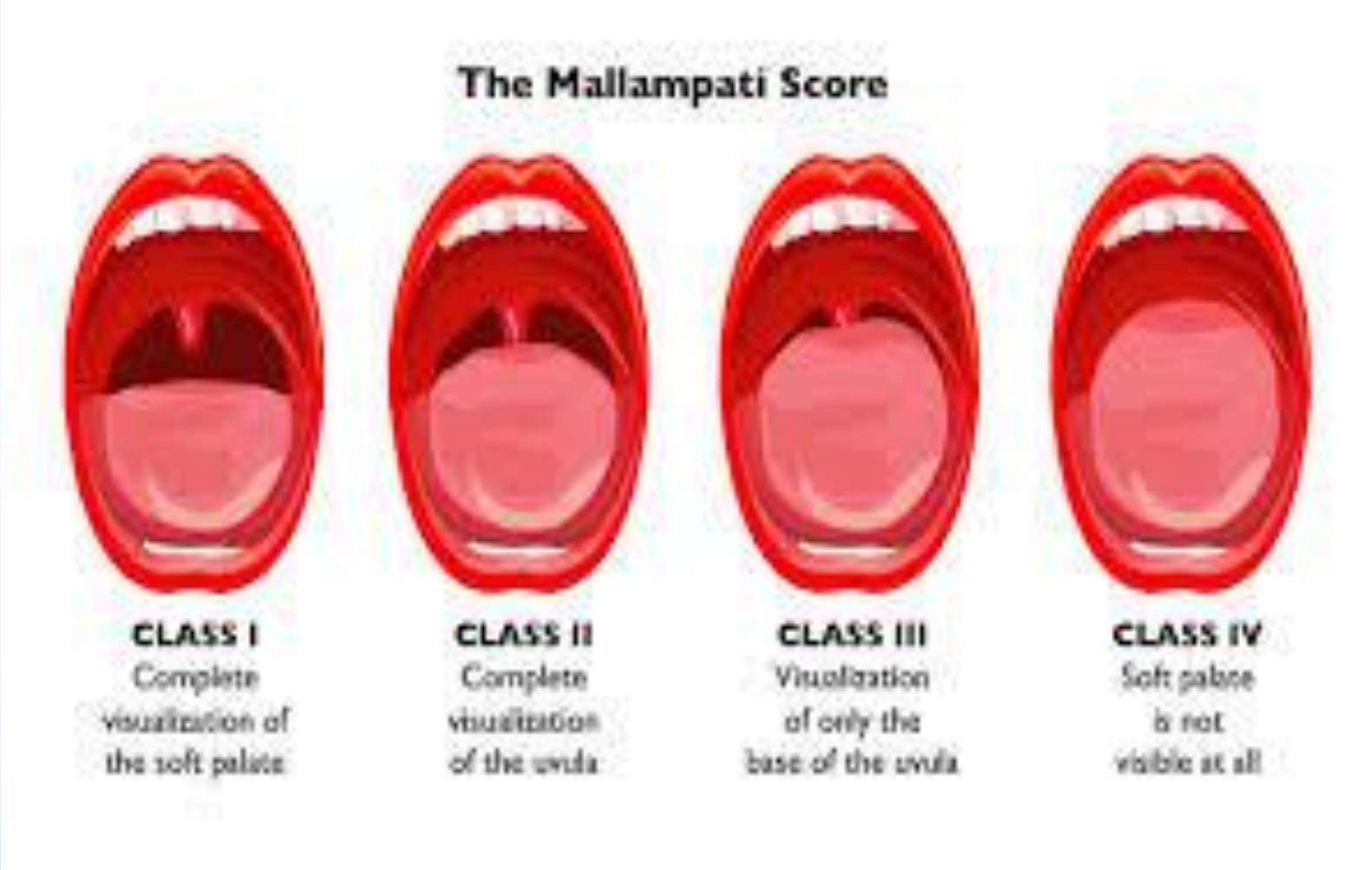


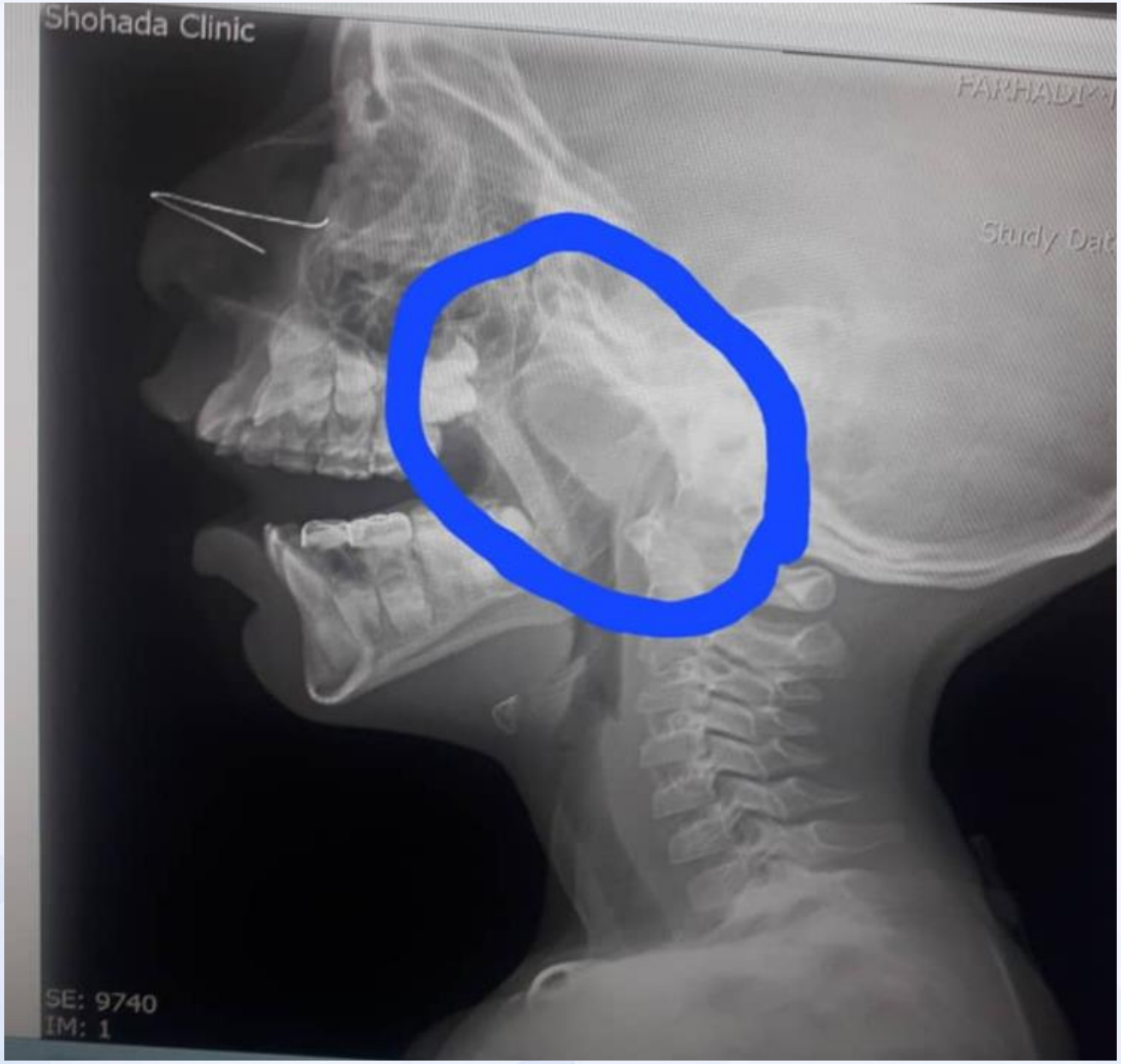
Evaluation

- history of signs and symptoms
- physical examination
- overnight polysomnography

CLINICAL CHARACTERISTICS

- Nocturnal Symptoms
- Daytime Symptoms


The Mallampati Score
CLASS I
Complete visualization of the soft palate
CLASS II
Complete visualization of the uvula
CLASS III
Visualization of only the base of the uvula
CLASS IV
Soft palate is not visible at all


Shohada Clinic
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PSG

POLYSOMNOGRAPHY

- clarify clinical suspicions
- confirm diagnoses
- degree of severity to inform treatment options

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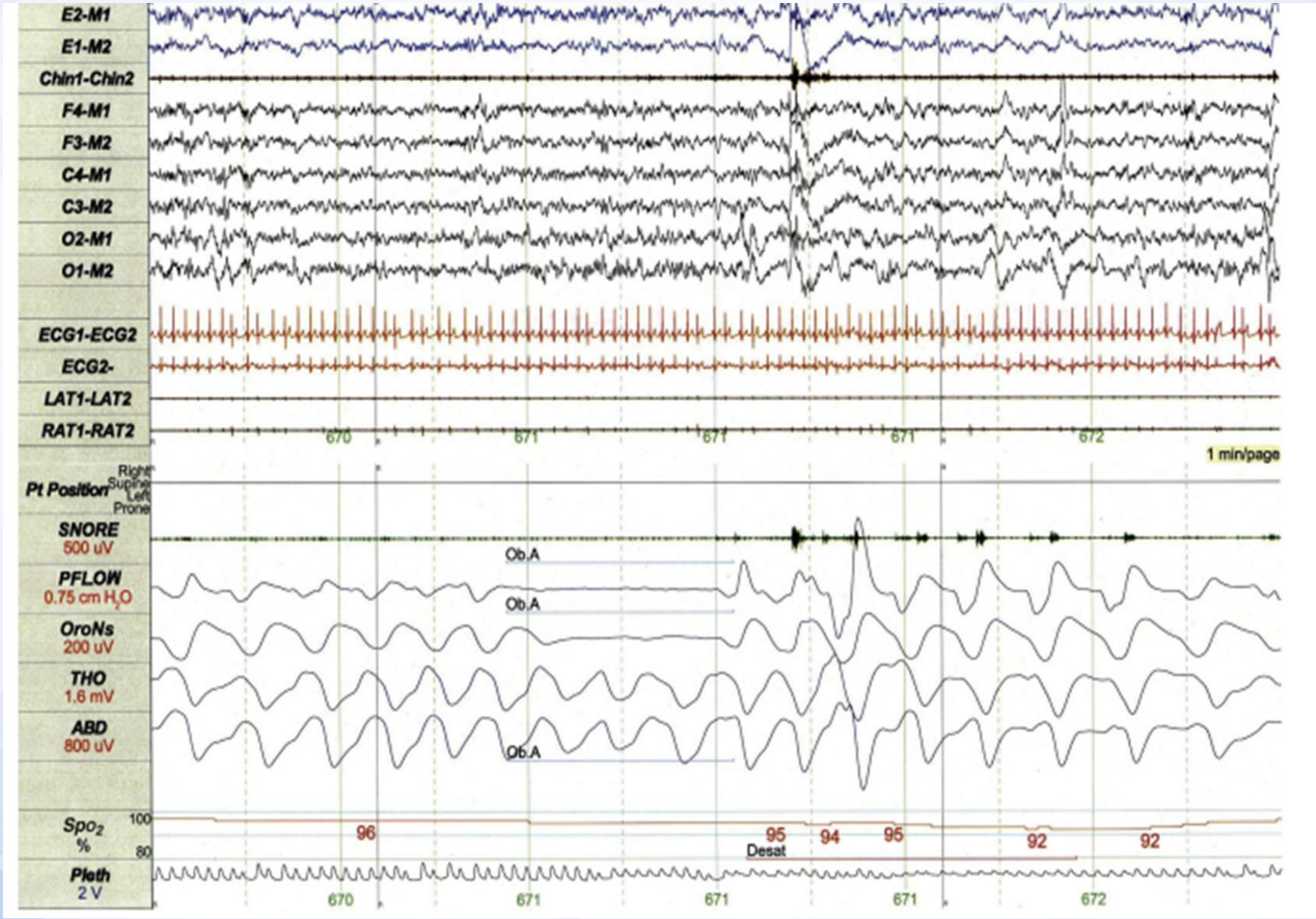
E2-M1
E1-M2
Chin1-Chin2
F4-M1
F3-M2
C4-M1
C3-M2
O2-M1
O1-M2
ECG1-ECG2
ECG2-
LAT1-LAT2
RAT1-RAT2
670
671
671
671
672
1 min/page
Pt Position
Right
Supine
Left
Prone
SNORE
500 uV
PFLOW
0.75 cm H2O
OroNs
200 uV
THO
1.6 mV
ABD
800 uV
Ob.A
Ob.A
Ob.A
Spo2
%
100
80
96
95
94
95
92
92
Desat
Pleth
2 V
670
671
671
671
672

Respiratory Analysis

	Number (Index)
Obstructive	53 (7.7)
Mixed	3 (0.4)
Central	16 (2.3)
Undef Ap.	-
Total Ap.	72 (10.4)
Hypopnea	71 (10.3)
A+H	**143 (20.7)**
Limitation	-
RERAs	-
RDI	143 (20.7)

	REM	Non-REM	Sleep
Apnea (Index)	16 (16.0)	56 (9.5)	72 (10.4)
Hypopnea (Index)	15 (15.0)	56 (9.5)	71 (10.3)
AHI / RDI [/h]	30.9 / 30.9	19.0 / 19.0	20.7 / 20.7
Flow Limitation (Index)	-	-	-
RERAs (Index)	-	-	-
Max. Apnea Duration [s]	13	15	15
Max. Hypopnea Duration [s]	11	20	20
Average Apnea Dur. [s]	9.0	8.6	8.7
Average Hypopnea Dur. [s]	8.5	9.9	9.6
Artefact [min]	6.4 (9.6%)	57.8 (14%)	64.2 (13.4%)

Hypopnea-rules 1: Desaturation 3 %, Ratio 70 %.

Position	Supine	not Supine	Left	Right	Prone	Upright
Sleep Time Fraction [%]	0.7	99.3	-	-	-	99.3

PSG

- Polysomnography is indicated when there is clinical evidence of a sleep related breathing disorder in infants who have experienced an apparent life-threatening event (ALTE). (Guideline)

- Clinical suspicion of SRBD in a patient with ALTE should prompt consideration of PSG.

To confirm clinically suspected OSAS

- **Pre-operatively**

After T&A in children with mild OSAS pre-operatively only if suspicion of non-resolution remains on clinical follow-up

- **Post-operatively**

To confirm resolution of OSAS after T&A in children with high pre-operative risk of non-resolution of OSAS following T&A

- **Post-operatively**

Pre-operatively

- all children should be screened for snoring;
- If the child snores on a regular basis (≥3times/week) and has signs/symptoms of OSA:
- complex high-risk patients should be referre;
- patients with cardiorespiratory failure can not wait elective evaluation;

Pre-operatively

- Adenotonsillectomy (AT) is commonly performed as a first line treatment of OSAS in children, yet the diagnosis of OSAS is often based on clinical parameters
- PSG is indicated to diagnose OSAS prior to AT.
- The preoperative AHI can guide the physician in perioperative and postoperative management.
- Clinical parameters :unreliable for predicting OSAS.
- AT is a surgical procedure with a risk of hemorrhage, infection, upper airway compromise, pain, and should only be performed if necessary.
- Children with certain medical disorders are at higher surgical risk (e.g., sickle cell anemia, HIV, coagulopathies, congenital heart disease).
- Severe OSAS : higher risk for certain postoperative complications including respiratory compromise and postoperative respiratory complications.

Post-operatively

- PSG is indicated for positive airway pressure (PAP) titration .(Standard)
- Follow-up PSG in children on chronic PAP support .(Guideline)
- PSG is indicated after treatment of children for OSA with rapid maxillary expansion.(Option)
- Follow-up children with OSA treated with an oral appliance.(option)

- mild and moderate OSA preoperatively → residual symptoms → PSG.

- severe OSA, obesity, craniofacial anomalies, and neurologic disorders PSG following AT.

→

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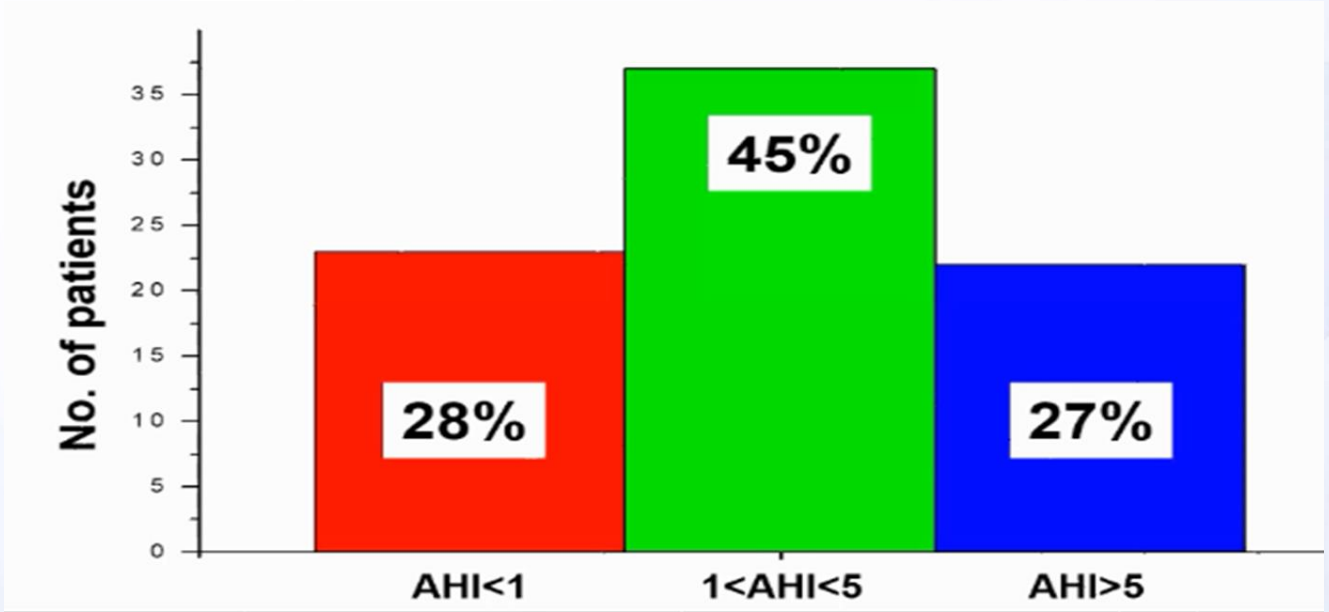
Tauman reported complete normalization of patients with OSA after adenotonsillectomy in only 25%, with 46% having persistent mild OSA (1 , AHI , 5), and 29% having at least moderate OSA (AHI > 5).



OTHER UPPER AIRWAY SURGERIES

obstruction at multiple levels or persistent OSAS,

- UPPP : Obstruction at the level of the palate :,
- Expansion sphincter pharyngoplasty; Obstruction at the level of the lateral pharyngeal walls
- turbinate reduction ;
- mandibular advancement or mandibular distraction osteogenesis ;
- Genioglossus advancement: body of evidence is small and most studies involve adults
- Tracheotomy : severe craniofacial abnormalities or neuromuscular conditions causing hypotonia,

PAP THERAPY

- ***Craniofacial anomalies,***
- ***Obesity,***
- ***Developmental , Neuromuscular problems,***
- ***Congenital problems (Down Syndrome ,Bronchomalacia , BPD, CP ….)***
- ***Persistent OSA after UA surgery (AHI > 5 after A& T)***
- ***Contraindication for UA surgery,***
- ***Central Apnea***
- ***Hypoventilation***
- ***It also may be appropriate to stabilize children with severe OSA prior to adenotonsillectomy or another surgical procedure***

Other treatments

- ***ORAL MYOFUNCTIONAL THERAPY (OMT)***
- ***INTRANASAL CORTICOSTEROIDS***
- ***SYSTEMIC CORTICOSTEROIDS***


Thank you for your attention
Best wishes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